
FOUR MAJOR CANCERS BY GEOGRAPHIC REGIONS IN MASSACHUSETTS

1999-2003

Bureau of Health Information, Statistics,
Research, and Evaluation

Massachusetts Department of Public Health

December 2007

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INTRODUCTION

This report is a supplement to *Cancer Incidence and Mortality in Massachusetts 1999-2003: Statewide Report*. It provides a pictorial representation of the incidence rates for four major cancer types: male prostate cancer, female breast cancer, colorectal cancer for both sexes, and lung cancer for both sexes. These four cancers represented 56% of all incident cases within Massachusetts during 1999-2003. Age-adjusted incidence rates were stratified by sex, stage at diagnosis, and geographic region. (See **Terms and Definitions** below for further details.)

The cancer incidence rates that were calculated for this report were separated into geographic sections of the state using the following six regions, as defined by the Massachusetts Executive Office of Health and Human Services (EOHHS): Western, Central, Northeast, Metro West, Southeast, and Boston. (A listing of cities and town by region is presented in Appendix I.) Data for each region were stratified into early-stage and late-stage categories. (See **Terms and Definitions**, below.) This report presents the cancer incidence rates by region as preliminary data that can be used for further study. By using these preliminary data for the six EOHHS regions, to focus and refine future analyses, we hope that the data can help to direct cancer screening, prevention, and outreach activities.

TERMS AND DEFINITIONS

Staging – A type of classification used to describe the spread of cancer from the site of origin. Cancer is staged based on pathological and clinical results of testing. The stage definitions provide the general classifications for the five stages of cancer diagnosis.

There are five stage classifications (1):

1. **In Situ** - The earliest stage of cancer, before the cancer has spread, when it is limited to a small number of cells and has not invaded the organ itself.
2. **Localized** - The cancer is found only in the body part (organ) where it began; it hasn't spread to any other parts.
3. **Regional** - The cancer has spread beyond the original point where it started to the nearest surrounding parts of the body (other tissues).
4. **Distant** - The cancer has spread to parts of the body far away from the original point where it began. This is the most difficult stage to treat, since the cancer has spread throughout the body.
5. **Unstaged (Unknown)** – There is not enough information about the cancer to assign a stage. These cases have been omitted from analysis.

For the purposes of this report, cancer stages are summarized as follows:

- **Early Stage** – For breast, colorectal, and lung cancers, this is a combination of the *in situ* and localized stages. The exception is prostate cancer, where the early-stage category combines localized and regional stages and *in situ* cases are excluded from the analysis.
- **Late Stage** – For breast, colorectal, and lung cancers, this is a combination of the regional and distant stages. The exception is prostate cancer, where the late-stage category only contains cases diagnosed at a distant stage.

Note on prostate cancer staging: During this time period, the staging categorization for prostate cancer changed, making it necessary to combine localized and regional stages for analyzing long-term trends. Therefore, prostate cancers can be reported as either localized or regional stage, then the

numbers are combined for any further staging analyses. *In situ* stage was not collected or reported for prostate cancer during this time period.

Age-specific rates – Age-specific rates were calculated by dividing the number of people in an age group who were diagnosed with cancer (*incidence*) or died of cancer (*mortality*) in a given time frame by the number of people in that same age group overall during that time frame. Rates are presented per 100,000 persons, and are site- and sex-specific.

Age-adjusted rates – An age-adjusted incidence or mortality rate is a weighted average of the age-specific rates, where the weights are the proportions of persons in the corresponding age groups of a standard 100,000 population. The potential confounding effect of age is reduced when comparing age-adjusted rates for different age-structured populations. The 2000 U.S. Bureau of the Census population distribution was used as a standard. Rates were age-adjusted using 18 five-year age groups. It is important to note that age-adjusted rates can only be compared if they are adjusted to the same standard population. (2)

95% confidence limits (95% CL) - Confidence limits can be used as a conservative statistical test. The 95% confidence limits presented in this report mean that 95 times out of 100, this range of age-adjusted incidence rates will contain the true rate. (2) Confidence limits were used in this report to determine whether the regional age-adjusted incidence rates for each cancer were statistically significantly different from the state rates. The regional and state rates were statistically different with 95% probability if the confidence limits that surrounded the two rates *did not* overlap. The regional and state rates were not statistically different if the confidence limits that surrounded the two rates *did* overlap. The case counts, age-adjusted incidence rates, 95% confidence limits, and statistical significance for Figures 1 through 6 are presented in Appendix II.

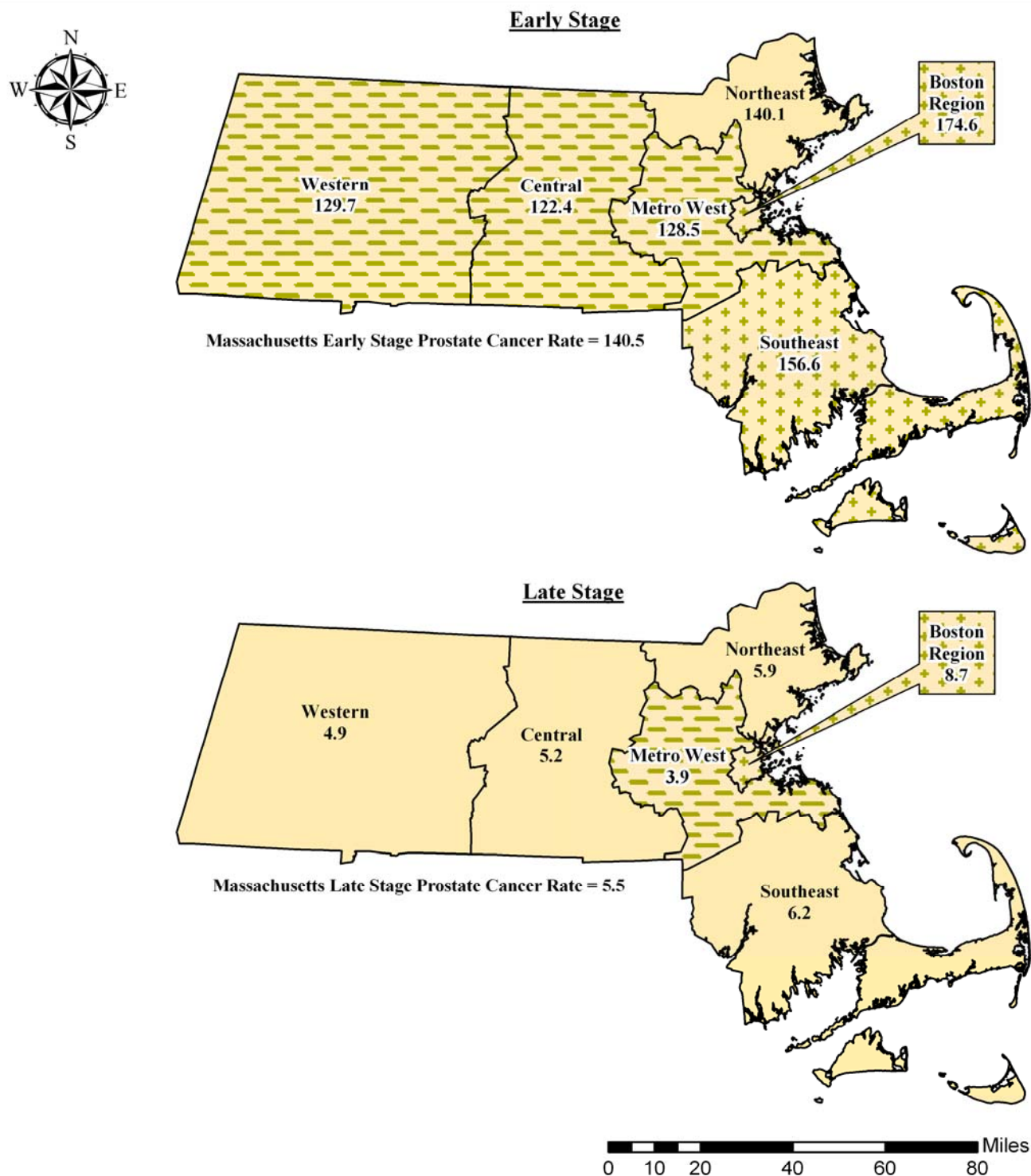
Population estimates – All of the population data were obtained from the Massachusetts Department of Public Health (MDPH) using the Massachusetts Community Health Information Profile (MassCHIP) demographic/census files.

SOURCES OF DATA

The Massachusetts Cancer Registry (MCR) is a population-based cancer registry that was established by state law in 1980 and began collecting data on cancer patients in January of 1982. For the time period covered by this report, the MCR collected reports on newly diagnosed cancer cases from all Massachusetts acute care hospitals and one medical practice association (76 reporting facilities). In 2002, the MCR started to receive case reports from 236 urologists' offices, two general laboratories, and one radiation treatment center. Definitions of the four cancer types are the same as in *Cancer Incidence and Mortality in Massachusetts 1999-2003: Statewide Report*, Appendix I. (2)

Maps in this report were generated using a computerized geographic information system (GIS). The MCR staff used the GIS software ArcMap version 9.1, distributed by Environmental Systems Research Institute, Inc. (ESRI), to display these cartographic data. The cartographic data depicted are collected, maintained, and distributed by the Executive Office of Environmental Affairs (EOEA), Office of Geographic and Environmental Information (MassGIS). Maps generated by the MCR meet standards set forth by the Massachusetts Department of Public Health for mapped data depiction.

Figure 1
Age-adjusted ¹ Male Prostate Cancer Incidence Rates ² by Stage at Diagnosis
Massachusetts by EOHHS Region
1999-2003



Map Key

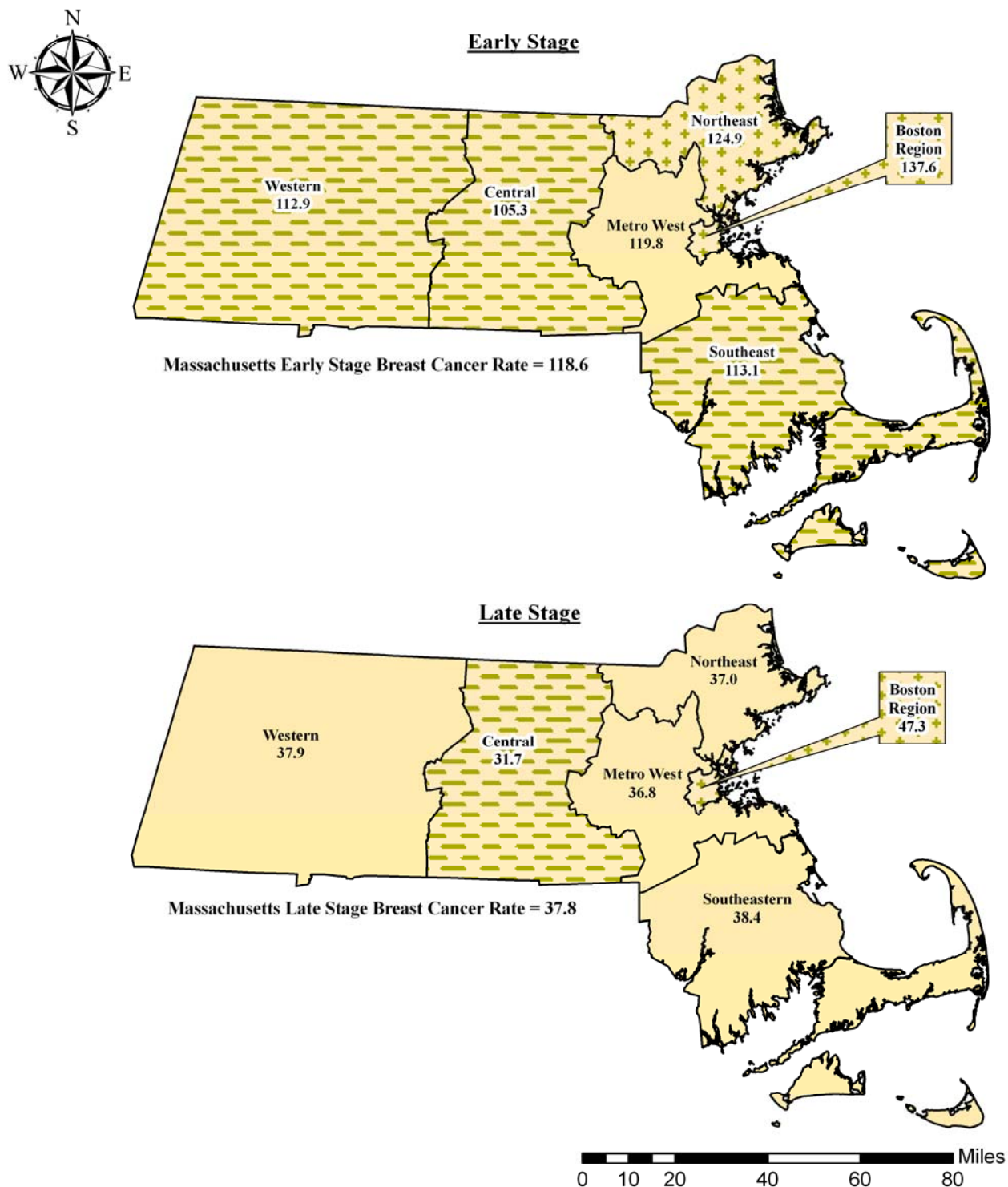
- Regional rate is statistically significantly higher than the state rate.
- Regional rate is statistically significantly lower than the state rate.
- Regional rate is not significantly different from state rate.

¹ Age-adjusted to the 2000 U.S. Standard Population ² per 100,000

Source: Massachusetts Department of Public Health, Bureau of Health Information, Statistics, Research and Evaluation, Massachusetts Cancer Registry
 Cartographic Data Source: Massachusetts Executive Office of Environmental Affairs, MassGIS



Figure 2
Age-adjusted ¹ Female Breast Cancer Incidence Rates ² by Stage at Diagnosis
Massachusetts by EOHHS Region
1999-2003



Map Key

- Regional rate is statistically significantly higher than the state rate.
- Regional rate is statistically significantly lower than the state rate.
- Regional rate is not statistically significantly different from the state rate.

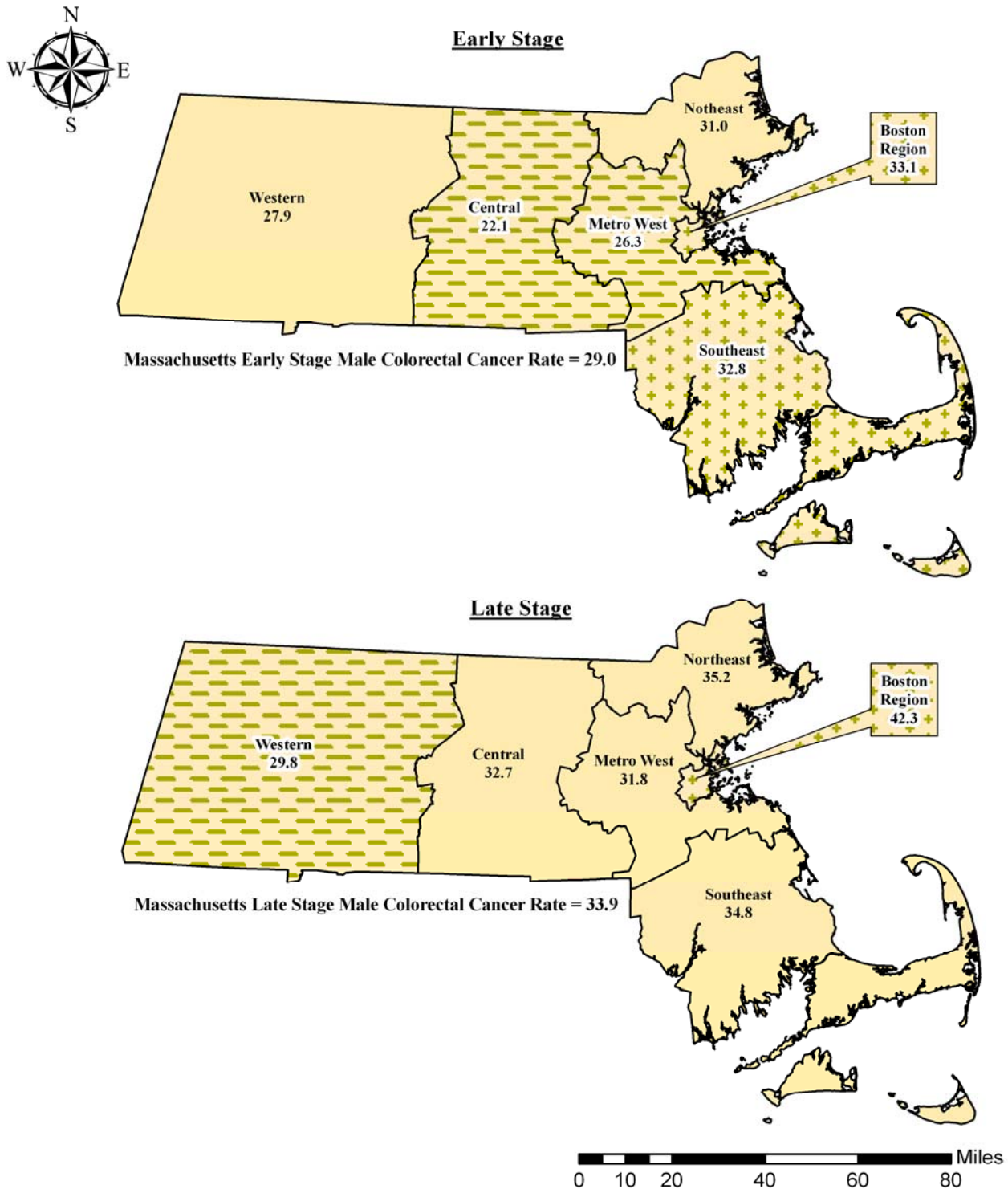
¹ Age-adjusted to the 2000 U.S. Standard Population ² per 100,000;

Source: Massachusetts Department of Public Health, Bureau of Health Information, Statistics, Research and Evaluation, Massachusetts Cancer Registry

Cartographic Data Source: Massachusetts Executive Office of Environmental Affairs, MassGIS.



Figure 3
Age-adjusted ¹ Male Colorectal Cancer Incidence Rates ² by Stage at Diagnosis
Massachusetts by EOHHS Region
1999-2003



Map Key

- Regional rate is statistically significantly higher than the state rate.
- Regional rate is statistically significantly lower than the state rate.
- Regional rate is not statistically significantly different from state rate.

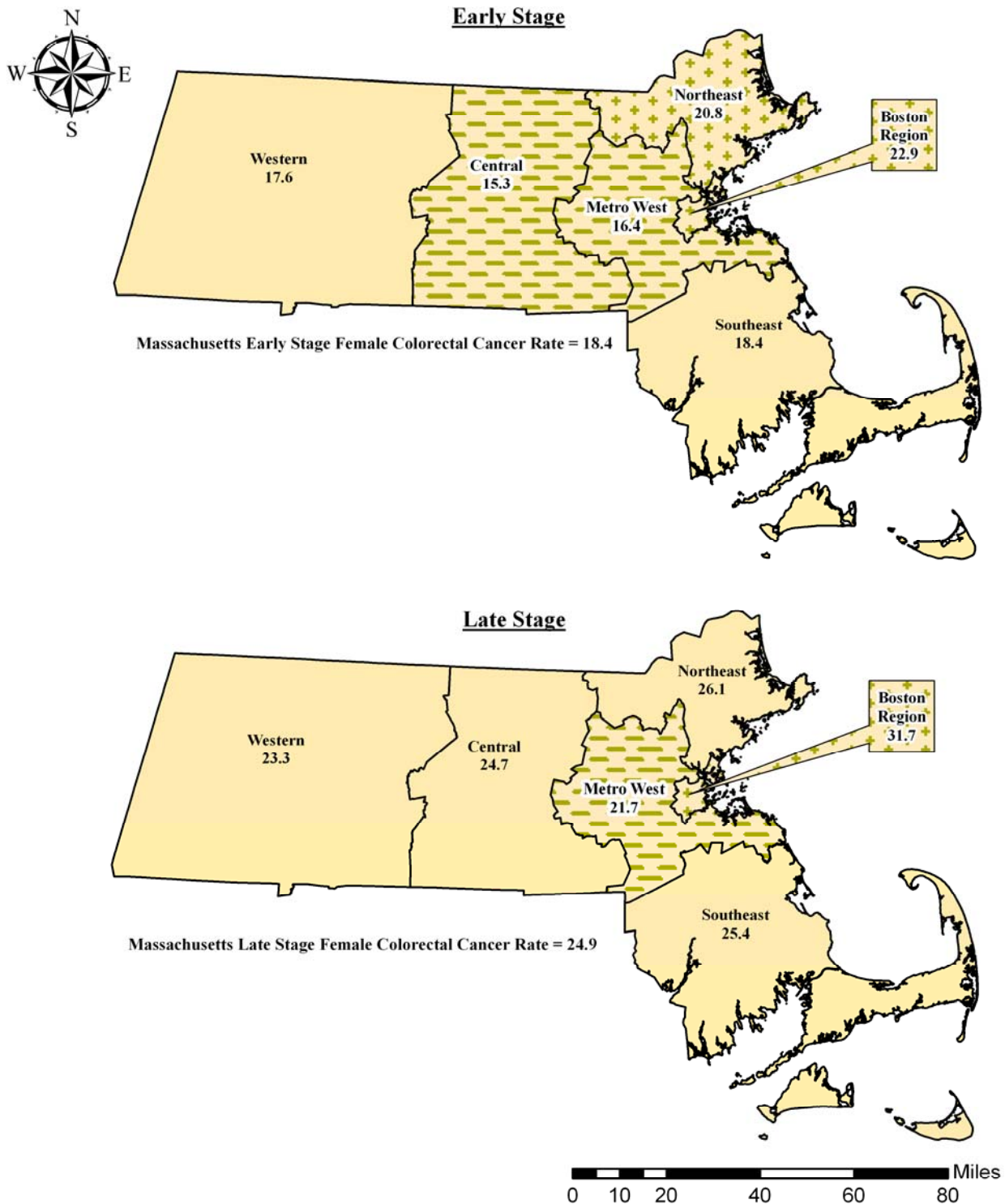
¹ Age-adjusted to the 2000 U.S. standard population ² per 100,000

Source: Massachusetts Department of Public Health, Bureau of Health Information, Statistics, Research and Evaluation, Massachusetts Cancer Registry

Cartographic Data Source: Massachusetts Executive Office of Environmental Affairs, MassGIS



Figure 4
Age-adjusted ¹ Female Colorectal Cancer Incidence Rates ² by Stage at Diagnosis
Massachusetts by EOHHS Region
1999-2003



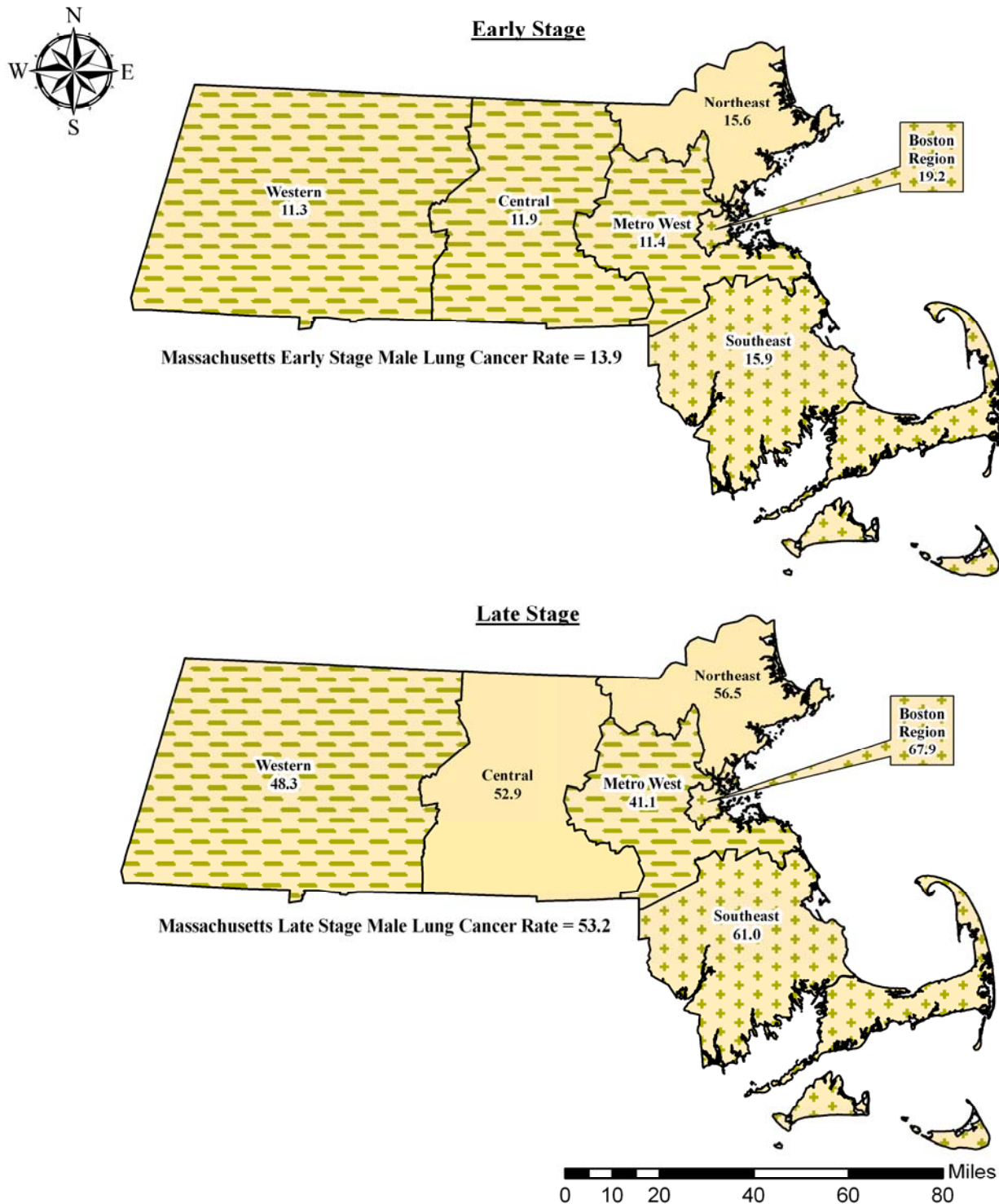
Map Key

- Regional rate is statistically significantly higher than the state rate.
- Regional rate is statistically significantly lower than the state rate.
- Regional rate is not statistically significantly different from state rate

¹ Age-adjusted to the 2000 U.S. Standard Population ² per 100,000;
 Source: Massachusetts Department of Public Health, Bureau of Health Information, Statistics, Research and Evaluation, Massachusetts Cancer Registry
 Cartographic Data Source: Executive Office of Environmental Affairs, MassGIS.



Figure 5
Age-adjusted ¹ Male Lung Cancer Incidence Rates ² by Stage at Diagnosis
Massachusetts by EOHHS Region
1999-2003



Map Key

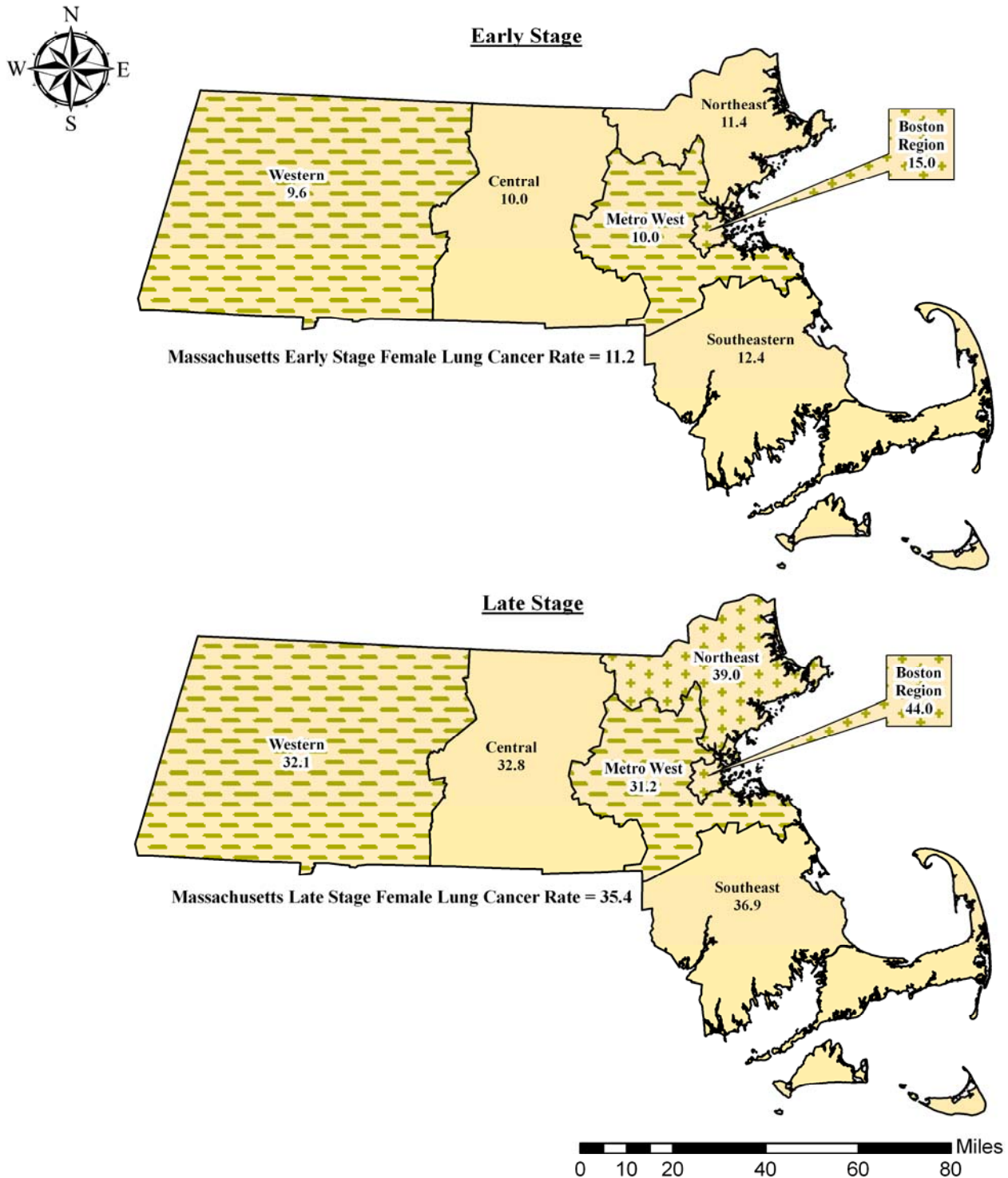
- Regional rate is statistically significantly higher than the state rate.
- Regional rate is statistically significantly lower than the state rate.
- Regional rate is not statistically significantly different from the state rate.

¹ Age-adjusted to the 2000 U.S. Standard Population ² per 100,000

Source: Massachusetts Department of Public Health, Bureau of Health Information, Statistics, Research and Evaluation, Massachusetts Cancer Registry
 Cartographic Data Source: Executive Office of Environmental Affairs, MassGIS.



Figure 6
Age-adjusted ¹ Female Lung Cancer Incidence Rates ² by Stage at Diagnosis
Massachusetts by EOHHS Region
1999-2003



Map Key

- Regional rate is statistically significantly higher than the state rate.
- Regional rate is statistically significantly lower than the state rate.
- Regional rate is not statistically significantly different from the state rate.

¹ Age-adjusted to the 2000 U.S. Standard Population ² per 100,000;

Source: Massachusetts Department of Public Health, Bureau of Health Information, Statistics, Research and Evaluation, Massachusetts Cancer Registry

Cartographic Data Source: Massachusetts Executive Office of Environmental Affairs, MassGIS.



DATA SUMMARY

For each region, cancer incidence was significantly higher or lower than for the state in at least one category (cancer type, stage, and sex). Table 1 provides a summary of statistical significance by sex, region, and stage. All results listed here were significant when the 95% confidence limits of the rates were compared. (Please see Table 1's footnote for an explanation of the symbols used.)

Table 1

**Statistical Significance¹ for the Four Major Cancers by Sex, Region, and Stage
Massachusetts, 1999-2003**

Region and Stage	Prostate male	Breast female	Colorectal		Lung	
			male	female	male	female
Western						
Early	-	-			-	-
Late			-		-	-
Central						
Early	-	-	-	-	-	
Late		-				
Northeast						
Early		+		+		
Late						+
Metro West						
Early	-		-	-	-	-
Late	-			-	-	-
Southeast						
Early	+	-	+		+	
Late					+	
Boston						
Early	+	+	+	+	+	+
Late	+	+	+	+	+	+

¹ The patterns of minuses (-) and pluses (+) indicate regional statistical significance that is based on whether there is overlap in the 95% confidence limit ranges for the state and region. The state's rate is the reference for determining whether a region's rate has higher or lower significance. (-) indicates the region's rate is significantly *lower* than the state's rate. (+) indicates the region's rate is significantly *higher* than the state's rate.

To summarize, the analysis found the following *significant* elevations and decreases:

Significant findings by region:

- Western Massachusetts: Rates of early-stage prostate cancer (in males), breast cancer (in females), and lung cancer (in both males and females) were *lower* than the state rate. Rates of late-stage colorectal cancer (in males) and lung cancer (in both males and females) were *lower* than the state rate.
- Central Massachusetts: Rates of early-stage prostate cancer (in males), breast cancer (in females), colorectal cancer (in both males and females), and lung cancer (in males) were *lower* than the state rate. The rate of late-stage breast cancer (in females) was *lower* than the state rate.

- Northeast Massachusetts: Rates of early-stage breast cancer (in females) and colorectal cancer (in females) were *higher* than the state rate. The rate of late-stage lung cancer (in females) was *higher* than the state rate.
- Metro West Massachusetts: Rates of early-stage prostate cancer (in males), colorectal cancer (in both males and females), and lung cancer (in both males and females) were *lower* than the state rate. Rates of late-stage prostate cancer (in males), colorectal cancer (in females), and lung cancer (in both males and females) were *lower* than the state rate.
- Southeast Massachusetts: Rates of early-stage prostate cancer (in males), colorectal cancer (in males), and lung cancer (in males) were *higher* than the state rate. The rate of early-stage breast cancer (in females) was *lower* than the state rate. The rate of late-stage lung cancer (in males) was *higher* than the state rate.
- Boston: Boston's rates of early and late-stage cancers were *higher* than the state rates in all categories.

Significant findings by stage:

Early stage:

- The Western region had *lower* rates of prostate cancer (in males), breast cancer (in females), and lung cancer (in both males and females) compared with statewide incidence rates.
- The Central region had *lower* rates of prostate cancer (in males), breast cancer (in females), lung cancer (in males), and colorectal cancer (in both males and females) compared with statewide incidence rates.
- The Northeast region had *higher* rates of breast cancer (in females) and colorectal cancer (in females) compared with statewide incidence rates.
- The Metro West region had *lower* rates of prostate cancer (in males), colorectal cancer (in both males and females), and lung cancer (in both males and females) compared with statewide incidence rates.
- The Southeast region had *lower* rates of breast cancer (in females) compared with statewide incidence rates. This region also had *higher* rates of prostate cancer (in males), colorectal cancer (in males), and lung cancer (in males) compared with statewide incidence rates.
- The Boston region had *higher* rates of all cancers compared with statewide incidence rates.

Late stage:

- The Western region had *lower* rates of colorectal cancer (in males) and lung cancer (in both males and females) compared with statewide incidence rates.
- The Central region had *lower* rates of breast cancer (in females) compared with statewide incidence rates.
- The Northeast region had *higher* rates of lung cancer (in females) compared with statewide incidence rates.

- The Metro West region had *lower* rates of prostate cancer (in males), colorectal cancer (in females), and lung cancer (in both males and females) compared with statewide incidence rates.
- The Southeast region had *higher* rates of lung cancer (in males) compared with statewide incidence rates.
- The Boston region had *higher* rates of all cancers compared with statewide incidence rates.

DATA LIMITATIONS AND DISCUSSION

It is important to note that the incidence rates within these stage categories provide only *general* information about the distribution of cancer within Massachusetts. While this information can help to identify areas of possible concern, additional factors must be considered.

When reviewing these preliminary data, each cancer should be considered separately, as different cancers have different risk factors. Many factors can influence whether a person develops cancer and the stage at which that cancer is diagnosed. These factors include race/ethnicity, smoking status, exposure history, length of residency, health behaviors, access to medical care, and aging. Such factors may be differently distributed in different regions. For example, a portion of the state may have a younger or older population than the state as a whole, better or poorer access to care, or lower or higher smoking rates. Additionally, the completeness of information on these factors may vary. Thus, it is critical to include information on as many of these factors as possible. (3, 4; Wendy Cozen, DO, MPH, University of Southern California Cancer Surveillance Program, written communication, May 20, 2005.)

The cancer incidence data that are reported to the registry also have limitations and may include classification errors. These possible limitations and errors are discussed in further detail in *Cancer Incidence and Mortality in Massachusetts 1999-2003: Statewide Report* (2) and *Cancer Incidence in Massachusetts 1999-2003: City and Town Supplement* (5).

First, Massachusetts residents may decide to seek medical care outside of Massachusetts, as a facility in a bordering state may be closer to their home. The Registry has established cooperative agreements with many other state registries, including all bordering states, to share data with each other. This decreases the possibility of losing cases due to non-reporting, but there is no way to verify that all out-of-state cases are being captured with this system.

Second, data are collected from various types of medical facilities. Hospitals remain the primary source of case reports, but changes in how cancers are diagnosed and treated mean that more patients are being treated in non-hospital facilities such as physicians' offices and outpatient radiation facilities. Cases that are treated in such facilities may not be reported by hospitals. The Registry continues to add these facilities to its collection system, but a lack of computerized registry systems, trained registrars, and enforcement rules in non-hospital facilities make it hard to verify that all cases are being collected.

Finally, patients themselves may provide incomplete or inaccurate data to health care providers. The address is one piece of data that can be given or recorded incorrectly. The address reported in the hospital *should* be where the patient was living at the time of diagnosis, but may in fact be a P.O. Box, a temporary address for treatment only, or a long-term housing facility address. Such an incorrect address can lead to the case being assigned to the wrong geographic location. This is an example of

informational bias, where the incorrect address can place the case into the wrong city or town in Massachusetts or even classify the patient's residence as unknown.

Boston was the only region for which rates were significantly higher than the state's rate for all cancers, in both stage categories. This region needs further study in order to better understand why these elevations are present. The data categories previously noted, such as smoking, race/ethnicity, socioeconomic status, access to care, and other factors specific to each cancer could be contributing to these higher regional rates. The size and diversity of the Boston region's population needs to be considered as well. The Boston regional data provide a good example of how these preliminary results can be used to identify areas in which further study is required, and help to identify the specific needs of particular populations.

For these reasons, the rates presented in these maps and tables should only be used in a preliminary fashion for identifying regions in which further study may be warranted.

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APPENDIX I

Cities and Towns for each Region

- Western Massachusetts: Adams, Agawam, Alford, Amherst, Ashfield, Athol, Becket, Belchertown, Bernardston, Blandford, Buckland, Charlemont, Cheshire, Chester, Chesterfield, Chicopee, Clarksburg, Colrain, Conway, Cummington, Dalton, Deerfield, East Longmeadow, Easthampton, Egremont, Erving, Florida, Gill, Goshen, Granby, Granville, Great Barrington, Greenfield, Hadley, Hampden, Hancock, Hatfield, Hawley, Heath, Hinsdale, Holyoke, Huntington, Lanesborough, Lee, Lenox, Leverett, Leyden, Longmeadow, Ludlow, Middlefield, Monroe, Monson, Montague, Monterey, Montgomery, Mount Washington, New Ashford, New Marlborough, New Salem, North Adams, Northampton, Northfield, Orange, Otis, Palmer, Pelham, Peru, Petersham, Phillipston, Pittsfield, Plainfield, Richmond, Rowe, Royalston, Russell, Sandisfield, Savoy, Sheffield, Shelburne, Shutesbury, South Hadley, Southampton, Southwick, Springfield, Stockbridge, Sunderland, Tolland, Tyringham, Ware, Warwick, Washington, Wendell, West Springfield, West Stockbridge, Westfield, Westhampton, Whately, Wilbraham, Williamsburg, Williamstown, Windsor, Worthington
- Central Massachusetts: Ashburnham, Ashby, Auburn, Ayer, Barre, Bellingham, Berlin, Blackstone, Bolton, Boylston, Brimfield, Brookfield, Charlton, Clinton, Douglas, Dudley, East Brookfield, Fitchburg, Franklin, Gardner, Grafton, Groton, Hardwick, Harvard, Holden, Holland, Hopedale, Hubbardston, Lancaster, Leicester, Leominster, Lunenburg, Medway, Mendon, Milford, Millbury, Millville, New Braintree, North Brookfield, Northbridge, Oakham, Oxford, Paxton, Pepperell, Princeton, Rutland, Shirley, Shrewsbury, Southbridge, Spencer, Sterling, Sturbridge, Sutton, Templeton, Townsend, Upton, Uxbridge, Wales, Warren, Webster, West Boylston, West Brookfield, Westminster, Winchendon, Worcester
- Northeast Massachusetts: Amesbury, Andover, Beverly, Billerica, Boxborough, Chelmsford, Danvers, Dracut, Dunstable, Essex, Everett, Georgetown, Gloucester, Groveland, Hamilton, Haverhill, Ipswich, Lawrence, Lowell, Lynn, Lynnfield, Malden, Manchester, Marblehead, Medford, Melrose, Merrimac, Methuen, Middleton, Nahant, Newbury, Newburyport, North Andover, North Reading, Peabody, Reading, Rockport, Rowley, Salem, Salisbury, Saugus, Stoneham, Swampscott, Tewksbury, Topsfield, Tyngsborough, Wakefield, Wenham, West Newbury, Westford
- Metro West Massachusetts: Acton, Arlington, Ashland, Bedford, Belmont, Boxborough, Braintree, Burlington, Canton, Carlisle, Cohasset, Concord, Dedham, Dover, Foxborough, Framingham, Hingham, Holliston, Hopkinton, Hudson, Hull, Lexington, Lincoln, Littleton, Marlborough, Maynard, Medfield, Millis, Milton, Natick, Needham, Newton, Norfolk, Northborough, Norwell, Norwood, Plainville, Quincy, Randolph, Scituate, Sharon, Sherborn, Southborough, Stow, Sudbury, Walpole, Waltham, Watertown, Wayland, Wellesley, Westborough, Weston, Westwood, Weymouth, Wilmington, Winchester, Woburn, Wrentham

Southeast Massachusetts: Abington, Acushnet, Aquinnah, Attleboro, Avon, Barnstable, Berkley, Bourne, Brewster, Bridgewater, Brockton, Carver, Chatham, Chilmark, Dartmouth, Dennis, Dighton, Duxbury, East Bridgewater, Eastham, Easton, Edgartown, Fairhaven, Fall River, Falmouth, Freetown, Gosnold, Halifax, Hanover, Hanson, Harwich, Holbrook, Kingston, Lakeville, Mansfield, Marion, Marshfield, Mashpee, Mattapoisett, Middleborough, Nantucket, New Bedford, North Attleborough, Norton, Oak Bluffs, Orleans, Pembroke, Plymouth, Plympton, Provincetown, Raynham, Rehoboth, Rochester, Rockland, Sandwich, Seekonk, Somerset, Stoughton, Swansea, Taunton, Tisbury, Truro, Wareham, Wellfleet, West Bridgewater, West Tisbury, Westport, Whitman, Yarmouth

Boston: Boston, Brookline, Cambridge, Chelsea, Revere, Somerville, Winthrop

APPENDIX II

Number of Cases, Age-adjusted¹ Incidence Rates², 95% Confidence Limits (95% CL), and Statistical Significance³ for Prostate Cancer by Region and Stage

Massachusetts, 1999-2003
Males

Prostate				
early stage				
Region	Cases	Rates	95% CL	Significance
Western	2999	129.7	125.0–134.4	–
Central	2518	122.4	117.6–127.2	–
Northeast	4703	140.1	136.1–144.1	
Metro West	5297	128.5	125.0–131.9	–
Southeast	5685	156.6	152.5–160.7	+
Boston	2773	174.6	168.1–181.1	+
Statewide	23975	140.5	138.7–142.3	reference

Prostate				
late stage				
Region	Cases	Rates	95% CL	Significance
Western	105	4.9	3.9–5.8	
Central	100	5.2	4.1–6.2	
Northeast	178	5.9	5.0–6.8	
Metro West	146	3.9	3.3–4.6	–
Southeast	209	6.2	5.3–7.0	
Boston	130	8.7	7.2–10.2	+
Statewide	868	5.5	5.2–5.9	reference

¹age-adjusted to the 2000 U.S. Standard Population

²per 100,000

³The patterns of minuses (–) and pluses (+) indicate regional statistical significance that is based on whether there is overlap in the 95% confidence limit ranges for the state and region. The state's rate is the reference for determining whether a region's rate has higher or lower significance. (–) indicates the region's rate is significantly lower than the state's rate. (+) indicates the region's rate is significantly higher than the state's rate.

Number of Cases, Age-adjusted¹ Incidence Rates², 95% Confidence Limits (95% CL), and Statistical Significance³ for Breast Cancer by Region and Stage

Massachusetts, 1999-2003
Females

Breast				
early stage				
Region	Cases	Rates	95% CL	Significance
Western	3236	112.9	109.0–116.9	–
Central	2710	105.3	101.3–109.3	–
Northeast	5307	124.9	121.5–128.3	+
Metro West	6103	119.8	116.8–122.8	
Southeast	4984	113.1	109.9–116.2	–
Boston	2859	137.6	132.5–142.7	+
Statewide	25202	118.6	117.1–120.0	reference

Breast				
late stage				
Region	Cases	Rates	95% CL	Significance
Western	1068	37.9	35.6–40.2	
Central	804	31.7	29.5–33.9	–
Northeast	1554	37.0	35.2–38.9	
Metro West	1856	36.8	35.2–38.5	
Southeast	1666	38.4	36.6–40.3	
Boston	982	47.3	44.3–50.3	+
Statewide	7930	37.8	36.9–38.6	reference

¹age-adjusted to the 2000 U.S. Standard Population

²per 100,000

³The patterns of minuses (–) and pluses (+) indicate regional statistical significance that is based on whether there is overlap in the 95% confidence limit ranges for the state and region. The state's rate is the reference for determining whether a region's rate has higher or lower significance. (–) indicates the region's rate is significantly lower than the state's rate. (+) indicates the region's rate is significantly higher than the state's rate.

Number of Cases, Age-adjusted¹ Incidence Rates², 95% Confidence Limits (95% CL), and Statistical Significance³ for Colorectal Cancer by Region and Stage

Massachusetts, 1999-2003
Males

Colorectal				
early stage				
Region	Cases	Rates	95% CL	Significance
Western	639	27.9	25.7–30.1	
Central	445	22.1	20.0–24.1	–
Northeast	1009	31.0	29.1–32.9	
Metro West	1038	26.3	24.7–27.9	–
Southeast	1167	32.8	30.9–34.7	+
Boston	517	33.1	30.2–35.9	+
Statewide	4815	29.0	28.2–29.8	reference

Colorectal				
late stage				
Region	Cases	Rates	95% CL	Significance
Western	674	29.8	27.6–32.1	–
Central	653	32.7	30.2–35.2	
Northeast	1135	35.2	33.1–37.3	
Metro West	1245	31.8	30.0–33.6	
Southeast	1231	34.8	32.9–36.8	
Boston	665	42.3	39.1–45.5	+
Statewide	5603	33.9	33.0–34.8	reference

¹age-adjusted to the 2000 U.S. Standard Population

²per 100,000

³The patterns of minuses (–) and pluses (+) indicate regional statistical significance that is based on whether there is overlap in the 95% confidence limit ranges for the state and region. The state's rate is the reference for determining whether a region's rate has higher or lower significance. (–) indicates the region's rate is significantly lower than the state's rate. (+) indicates the region's rate is significantly higher than the state's rate.

Number of Cases, Age-adjusted¹ Incidence Rates², 95% Confidence Limits (95% CL), and Statistical Significance³ for Colorectal Cancer by Region and Stage

Massachusetts, 1999-2003
Females

Colorectal				
early stage				
Region	Cases	Rates	95% CL	Significance
Western	571	17.6	16.2–19.1	
Central	420	15.3	13.9–16.8	–
Northeast	959	20.8	19.4–22.1	+
Metro West	915	16.4	15.3–17.5	–
Southeast	903	18.4	17.2–19.7	
Boston	530	22.9	20.9–24.9	+
Statewide	4298	18.4	17.8–18.9	reference

Colorectal				
late stage				
Region	Cases	Rates	95% CL	Significance
Western	761	23.3	21.6–25.0	
Central	693	24.7	22.8–26.5	
Northeast	1240	26.1	24.6–27.6	
Metro West	1237	21.7	20.5–23.0	–
Southeast	1251	25.4	24.0–26.9	
Boston	741	31.7	29.4–34.1	+
Statewide	5923	24.9	24.3–25.6	reference

¹age-adjusted to the 2000 U.S. Standard Population

²per 100,000

³The patterns of minuses (–) and pluses (+) indicate regional statistical significance that is based on whether there is overlap in the 95% confidence limit ranges for the state and region. The state's rate is the reference for determining whether a region's rate has higher or lower significance. (–) indicates the region's rate is significantly lower than the state's rate. (+) indicates the region's rate is significantly higher than the state's rate.

Number of Cases, Age-adjusted¹ Incidence Rates², 95% Confidence Limits (95% CL), and Statistical Significance³ for Lung Cancer by Region and Stage

Massachusetts, 1999-2003
Males

Lung				
early stage				
Region	Cases	Rates	95% CL	Significance
Western	256	11.3	9.9–12.7	–
Central	239	11.9	10.4–13.3	–
Northeast	505	15.6	14.3–17.0	
Metro West	451	11.4	10.4–12.5	–
Southeast	569	15.9	14.6–17.2	+
Boston	299	19.2	17.0–21.4	+
Statewide	2319	13.9	13.4–14.5	reference

Lung				
late stage				
Region	Cases	Rates	95% CL	Significance
Western	1117	48.3	45.5–51.2	–
Central	1079	52.9	49.8–56.1	
Northeast	1856	56.5	53.9–59.0	
Metro West	1628	41.1	39.1–43.1	–
Southeast	2196	61.0	58.4–63.6	+
Boston	1066	67.9	63.8–72.0	+
Statewide	8942	53.2	52.1–54.3	reference

¹age-adjusted to the 2000 U.S. Standard Population

²per 100,000

³The patterns of minuses (–) and pluses (+) indicate regional statistical significance that is based on whether there is overlap in the 95% confidence limit ranges for the state and region. The state's rate is the reference for determining whether a region's rate has higher or lower significance. (–) indicates the region's rate is significantly lower than the state's rate. (+) indicates the region's rate is significantly higher than the state's rate.

Number of Cases, Age-adjusted¹ Incidence Rates², 95% Confidence Limits (95% CL), and Statistical Significance³ for Lung Cancer by Region and Stage

Massachusetts, 1999-2003
Females

Lung				
early stage				
Region	Cases	Rates	95% CL	Significance
Western	292	9.6	8.5–10.7	–
Central	262	10.0	8.8–11.3	
Northeast	508	11.4	10.4–12.4	
Metro West	533	10.0	9.1–10.7	–
Southeast	577	12.4	11.3–13.4	
Boston	328	15.0	13.4–16.7	+
Statewide	2500	11.2	10.8–11.6	reference

Lung				
late stage				
Region	Cases	Rates	95% CL	Significance
Western	960	32.1	30.0–34.1	–
Central	857	32.8	30.6–35.1	
Northeast	1718	39.0	37.2–40.9	+
Metro West	1667	31.2	29.7–32.7	–
Southeast	1711	36.9	35.1–38.7	
Boston	955	44.0	41.1–46.8	+
Statewide	7868	35.4	34.7–36.2	reference

¹age-adjusted to the 2000 U.S. Standard Population

²per 100,000

³The patterns of minuses (–) and pluses (+) indicate regional statistical significance that is based on whether there is overlap in the 95% confidence limit ranges for the state and region. The state's rate is the reference for determining whether a region's rate has higher or lower significance. (–) indicates the region's rate is significantly lower than the state's rate. (+) indicates the region's rate is significantly higher than the state's rate.